STAT 422-622 – BAYESIAN DATA ANALYSIS
SYLLABUS – Fall 2015

Instructor
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Office hours by appointment only

Meeting Time: MW 2:30pm – 3:45pm, Keck 101

Attendance: Students should register for the course through Rice University. Those who wish to audit the course should obtain written permission from the Instructors.

Course Description
The aim of this course is to introduce students to the Bayesian statistical modeling and inference and to the related computational strategies and algorithms. The course starts with the treatment of simple models, such as those based on normal and binomial distributions. Concepts of conjugate and non informative priors are illustrated, for single- and multi-parameters models. More advanced models are then treated, including hierarchical models, linear regression models and generalized linear models. Bayesian computational methods (MCMC), including Gibbs sampler and Metropolis-Hastings algorithms, are presented with an emphasis to the issues related to their implementation and monitoring of convergence. The course will be fairly mathematical, with applications to real data problems.

Pre-requisites: Stat 410 (Regression and statistical computing).

Course Assignments
Homeworks will be due at the start of the class period on the deadline date. No late homework will be accepted. Illness and family emergencies will be dealt with on an individual basis. Each homework question will be worth 10 points. Graded homeworks will be returned timely. Students must complete 60% of the homeworks to pass the class.

There will be two midterm exams. The tests will be closed-book. Students must complete both exams to pass the class.

Grading Policy: Homework: 30%**;** Test#1: 35%**;** Test#2: 35%

Textbook
Lecture slides will be made available. The major reference book will be "A first course in Bayesian statistical methods" (2009), by Peter Hoff. Springer Verlag. Another reference textbook will be "Bayesian Data Analysis", second edition, by Gelman, Carlin, Stern and Rubin. Chapman & Hall (2004). Review articles on key topics will be made available.

Course objectives and learning outcomes:
1. Develop an understanding of the basic concepts underlying the Bayesian approach to statistical thinking.
2. Develop skills and appreciation for the development of Bayesian models and prior choices.

3. Provide basic knowledge on Bayesian computing, for the practical application of Bayesian models to data problems solving.

Honor Code Policy
Students are encouraged to talk to each other, the teaching assistants or the instructor about any homework assignment. This assistance is limited to the discussion of the problem. Students are not allowed to look at homework problems or solutions or quizzes/exams from previous years. On written exams you will be asked to write and sign the honor code pledge. With your signature, you pledge that you have not been in communication about this exam with anybody, neither with any other student in the class, nor with any other person, other than the instructor. Questions about grades on homework/midterm papers should be brought to the attention of the Instructor within 5 days from the date you receive the graded papers.

Any student with a documented disability needing academic adjustments or accommodation is requested to speak with me during the first two weeks of class. All discussions will remain confidential. Students with disabilities should also contact Disability Support Services in the Ley Student Center.

Syllabus Change Policy
This syllabus is only a guide for the course and is subject to change with advanced notice.